UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE RD, STE 102
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

May 11, 2023

Bob Coffey
Executive Vice President, Nuclear Division
and Chief Nuclear Officer
Florida Power & Light Company
700 Universe Blvd.
Mail Stop: EX/JB
Juno Beach, FL 33408

SUBJECT: SEABROOK STATION – INTEGRATED INSPECTION REPORT 05000443/2023001

Dear Bob Coffey:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Seabrook Station. On April 20, 2023, the NRC inspectors discussed the results of this inspection with Kyle Barry, Nuclear Operations Site Director, and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Matthew R. Young

Digitally signed by Matthew R. Young
Date: 2023.05.11 13:24:31 -04'00'

Matt R. Young, Chief
Projects Branch 2
Division of Operating Reactor Safety

Docket No. 05000443
License No. NPF-86

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: SEABROOK STATION – INTEGRATED INSPECTION REPORT 05000443/2023001 DATED MAY 11, 2023

DISTRIBUTION:
MYoung, DORS
NWarnek, DORS
JDeBoer, DORS
JBresson, DORS
TDaun, DORS, SRI
SFlanagan, DORS, RI
ACass, DORS, AA
PZurawski, RI OEDO
RidsNrrPMSeabrook Resource
RidsNrrDorlLpl1 Resource

DOCUMENT NAME: https://usnrc.sharepoint.com/teams/Region-I-Branch-2/Shared Documents/Inspection Reports/Seabrook/2023/SB IR2023001.docx
ADAMS ACCESSION NUMBER: ML23129A193

x SUNSI Review		x Non-Sensitive ☐ Sensitive		x Publicly Available ☐ Non-Publicly Available	
OFFICE	RI/DORS	RI/DORS	RI/DORS		
NAME	TDaun	JDeBoer	MYoung		
DATE	5/9/2023	5/9/2023	5/8/2023		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000443
License Number:	NPF-86
Report Number:	05000443/2023001
Enterprise Identifier:	I-2023-001-0041
Licensee:	NextEra Energy Seabrook, LLC
Facility:	Seabrook Station
Location:	Seabrook, New Hampshire
Inspection Dates:	January 1, 2023 to March 31, 2023
Inspectors:	T. Daun, Acting Senior Resident Inspector C. Newport, Senior Resident Inspector S. Flanagan, Acting Resident Inspector P. Cataldo, Senior Reactor Inspector S. Elkhiamy, Senior Project Engineer N. Floyd, Senior Reactor Inspector B. Lehman, Structural Engineer G. Thomas, Senior Civil Engineer
Approved By:	Matt R. Young, Chief Projects Branch 2 Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. NRC continued monitoring the licensee's performance by conducting an integrated inspection at Seabrook Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None

PLANT STATUS

Seabrook Station began the inspection period operating at 100 percent rated thermal power. On March 31, 2023, the plant commenced down power in preparation for refueling outage 22.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed activities described in IMC 2515, Appendix D, "Plant Status," conducted routine reviews using IP 71152, "Problem Identification and Resolution," observed risk significant activities, and completed on-site portions of IPs. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated the adequacy of the overall preparations to protect risk significant systems from impending severe weather during extreme cold temperatures on February 3, 2023

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 03.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) 'A' service water cooling tower following scheduled maintenance on January 15, 2023
(2) Emergency feedwater system during power supply replacement for the main feedwater pump recirculation valves on January 17, 2023
(3) 'A' vital direct current distribution during 'A' vital battery testing on March 21, 2023

71111.05 - Fire Protection

Fire Area Walkdown and Inspection (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Primary auxiliary building primary component cooling water area (PAB-F-2C-Z) on February 17, 2023
(2) Primary auxiliary building charging pump area (PAB-F-1A-Z) on February 17, 2023
(3) Emergency feedwater pump house (EFP-F-1-A) on March 17, 2023
(4) Main steam and feedwater pipe enclosure - east (MS-F-1A-Z1) on March 17, 2023
(5) Residual heat removal equipment vault - train 'B' (RHR-F-1B/1D/4B-Z) on March 17, 2023

Fire Brigade Drill Performance (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated the on-site fire brigade training and performance during an unannounced fire drill on February 2, 2023

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

(1) The inspectors observed and evaluated licensed operator performance in the control room during power reduction and main turbine control valve testing on February 24, 2023

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

(1) The inspectors observed and evaluated licensed operator training conducted in the plant reference simulator on February 15, 2023

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components remain capable of performing their intended function:

(1) Alkali silica reaction and building deformation monitoring portion of the Structures Monitoring Program on March 7, 2023
(2) Radiation monitors 50.65a(1) action plan on March 31, 2023

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management (IP Section 03.01) (1 Sample)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Risk associated with aligning 'C' vital battery to the 'A' vital inverter on March 20, 2023

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (4 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) 'B' coolant charging pump vibrations (AR 02445126) on January 5, 2023
(2) Emergency feedwater steam supply valve seat leakage (AR 02447144) on February 1, 2023
(3) 'A' coolant charging pump vibrations (AR 02437962) on February 27, 2023
(4) Electrical vaults W09 and W10 and circulating water/service water pumphouse structures identified as exceeding their building deformation threshold limits (ARs 02444503, 02446368, and 02446738) on March 8, 2023

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage (IP Section 03.01) (1 Partial)

(1) (Partial)
The inspectors evaluated refueling outage 22 activities from March 27, 2023 to March 31, 2023. The inspectors completed inspection procedure Section 03.01.a.

71111.24 - Testing and Maintenance of Equipment Important to Risk

The inspectors evaluated the following testing and maintenance activities to verify system operability and/or functionality:

Post-Maintenance Testing (IP Section 03.01) (2 Samples)

(1) 'A' cooling tower service water pump P-110A discharge piping leak test following repair the week of March 27, 2023
(2) 'B' service water following planned replacements of thermal overloads for service water valves on March 27, 2023

Surveillance Testing (IP Section 03.01) (5 Samples)

(1) 'B' emergency diesel generator semiannual surveillance and interlock test on January 3, 2023
(2) ‘B’ emergency diesel generator 24 hour run and hot restart on January 23, 2023
(3) 'B' residual heat removal quarterly flow and valve stroke test on February 23, 2023
(4) Quarterly rod operability surveillance on March 20, 2023
(5) Containment enclosure ventilation area drawdown surveillance test on March 31, 2023

Inservice Testing (IP Section 03.01) (1 Sample)

(1) 'A' coolant charging pump quarterly flow surveillance test on January 4, 2023

Diverse and Flexible Coping Strategies Testing (IP Section 03.02) (1 Sample)

(1) Supplemental emergency power system monthly availability surveillance test on February 21, 2023

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated the conduct of a routine, full participation emergency planning drill on February 15, 2023

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours (IP Section 02.01) (1 Sample)

(1) For the period January 1, 2022 through December 31, 2022

IE03: Unplanned Power Changes per 7000 Critical Hours (IP Section 02.02) (1 Sample)

(1) For the period January 1, 2022 through December 31, 2022

IE04: Unplanned Scrams with Complications (IP Section 02.03) (1 Sample)

(1) For the period January 1, 2022 through December 31, 2022

71152A - Annual Follow-up Problem Identification and Resolution

Annual Follow-up of Selected Issues (Section 03.03) (2 Samples)

(1) Review of NextEra's evaluation and corrective actions of safety-related structures affected by alkali silica reaction
(2) Review of recurrent cooling tower service water through-wall piping leaks

INSPECTION RESULTS

Observation: Review of NextEra's Evaluation and Corrective Actions of Safety-Related Structures Affected by Alkali Silica Reaction (ASR)	71152A
The NRC inspectors, with assistance from two technical staff members from the NRC Office of Nuclear Reactor Regulation, completed an on-site inspection at the Seabrook plant from March 6 to March 10, 2023 focused on NextEra‘s performance to monitor reinforced concrete structures affected by ASR and to establish corrective actions for those structures in accordance with their Structures Monitoring Program, approved methodology document, and their corrective action process. Specifically, the inspectors reviewed NextEra’s evaluations and corrective actions associated with ARs 02444503, 02446368, and 02446738 for the electrical vaults W09, W10, and the circulating water/service water pumphouse.	

As background, NextEra submitted License Amendment Request 16-03 and received NRC approval of their methodology to evaluate Seabrook safety-related structures affected by ASR. This methodology augments the original concrete design code of record to include ASR loads as an additional demand on the structure as a result of the effects of ASR expansion. Upon completion of the structural evaluations in accordance with this methodology, NextEra staff determined there were seven Seabrook structures that had specific structural elements (walls, slabs or beams) that would require physical modification or additional analysis to comply with their current licensing and design basis requirements. NextEra staff combined the specific structural elements from these structures into one consolidated prompt operability determination under AR 02276197 and documented the additional evaluations and calculations performed and their basis for concluding these structures remained functional, that is, capable of performing their intended safety functions to support continued plant safety. Subsequently, three additional structures have been added into the consolidated operability determination bringing the total number of structures to ten. The inspectors reviewed Revision 28 of the operability determination, approved on February 1, 2023, which was the most current revision.

Evaluation of Three Structures in the Operability Determination

The inspectors selected electrical vaults W09, W10, and the circulating water/service water pumphouse for review because the monitored expansion in these structures had recently exceeded the established threshold limits at monitored locations (one wall grid location for electrical vaults W09 and W10, and two wall grid locations for the circulating water/service water pumphouse). These exceedances resulted in specific structural elements of these structures to not meet the analyzed demand to capacity ratio acceptance criteria in accordance with the approved methodology. As such, these three structures were newly added to the consolidated operability determination since the last NRC inspection in May 2022. The structures will require additional analysis or, if determined to be needed by the reanalysis, a physical modification to conform with the methodology established in the license and design basis. NextEra revised the operability determination to document evaluations and bases to demonstrate that these impacted structures remained capable of performing their intended functions.

The inspectors performed independent walkdowns of accessible portions of these structures and reviewed reports of collected measurement data to verify that no adverse conditions (i.e., significant structural cracks or deformations indicative of distress) would invalidate NextEra's conclusions documented in their operability determination. In addition, the inspectors conducted interviews with responsible NextEra staff and their contractors to determine the status of ASR monitoring and the long-term corrective action plans to restore conformance of various Seabrook structures with structural elements which do not meet the current license and design basis. The inspectors reviewed the operability determination and supporting structural evaluations and calculations to verify whether NextEra staff appropriately justified the capability for these three selected structures as determined in accordance with NextEra's operability determination procedure and their methodology document.

The inspectors observed that the operability determination evaluations were conducted in accordance with NextEra's operability determination procedure, for the critical unusual load combination in the licensing basis, including the safe shutdown earthquake load, with load factors of 1.0 for all associated loads, and the most recent measured ASR expansion values amplified by 10 to 20 percent to provide for future expansion that may occur prior to the next inspection. Using this approach, NextEra staff determined that all three structures had demand to capacity ratios less than 1.0 with margin in the wall segments with the identified

threshold exceedances, which provided reasonable assurance that structural capability would be maintained for operability until the next inspection. The operability determination evaluations also considered impacts to rebar stress and concluded the rebar stress was not approaching the yield limit. The inspectors noted that the operability determinations identified compensatory inspection actions, with updated quantitative monitoring parameters and limits for operability and verification actions, that will be implemented on an increased frequency for electrical vaults W09 and W10 (every six months) and maintained frequency for circulating water/service water pumphouse (every six months) until corrective actions are completed. Based on discussions with NextEra staff, the inspectors noted the planned corrective actions are to reanalyze the three structures. The inspectors observed the ASR expansion trends at the exceedance locations indicate that future expansion is expected to remain within the new established operability determination limits past the next scheduled monitoring inspection with margin. The NRC inspectors determined that NextEra's operability evaluations provided reasonable assurance that the three structures were operable and remained capable of performing their intended functions.

Status of the Containment Internals Structure

As documented in NRC inspection report IR 05000443/2021004 (ADAMS ML22040A204), the inspectors identified a finding for NextEra not evaluating the containment internals structure when visual indications of potential ASR were identified in the reactor cavity pit area during the fall 2021 refueling outage. NextEra staff completed an operability determination for the containment internals structure and committed to perform a Stage 2 structural evaluation along with a root cause analysis to evaluate the impacts of ASR. The inspectors reviewed NextEra's corrective actions and preliminary conclusions from their in-process root cause. The inspectors determined NextEra's interim results did not change their previously documented operability determination conclusions that the containment internals structure remained capable to perform its intended safety functions. The inspectors noted that NextEra's initial analysis determined the observed concrete slab distress in the reactor pit area can likely be primarily attributed to thermal loading, stress concentrations, and thermal load cycle fatigue with potential smaller contributions of combined ASR expansion and swelling in the foundation and reactor cavity pit. The inspectors noted that NextEra's root cause evaluation and associated Stage 2 structural evaluation of the containment internals structure would be available for review in summer 2023.

Timing of Corrective Actions

The inspectors observed that there are currently ten structures in NextEra's operability determination process due to some individual structural elements that do not meet the NRC-approved methodology document. The methodology document outlines a process to monitor structures to limits that provide time for corrective actions to maintain the structure within the license and design basis. NextEra corrective action procedure PI-AA-104-1000 provides guidance to correct issues within one to two refueling cycles, while NRC guidance to inspectors in IMC 0326, Section 08.14, points to the corrective action program to provide a reasonable timeframe to restore to the license and design basis. The inspectors noted that five of these structures have been in the operability determination process since 2019 and, based on a review of corrective action program documents, several of the due dates were extended multiple times. The inspectors further noted that these five structures will require a physical modification as part of the corrective action whereas the other structures may instead undergo a reanalysis. While each of these ten structures have been demonstrated to be functional with a supporting technical basis, these additional technical approaches under the operability determination process were not intended to replace the approved methodology under the plant's license for an extended timeframe. In response to inspector questions,

NextEra staff provided project information that was last updated in 2022 and indicated that they planned to complete modifications and analyses by 2026. The inspectors observed that additional attention was warranted by NextEra staff to ensure timely completion of these planned corrective actions.

Extensometer Installation

As documented in NRC inspection report IR 05000443/2022002 (ADAMS ML22222A090), the inspectors identified a finding for NextEra not installing required extensometers in seven ASR Tier 3 locations as required by the Structure's Monitoring Program and Seabrook's ASR license conditions. The inspectors reviewed NextEra's corrective actions to resolve this issue. NextEra staff completed corrective actions to install extensometers in the seven required locations and updated the Structures Monitoring Program Manual to include a reference to each extensometer for the ASR Tier 3 locations or where applicable, documented an appropriate justification for exemption.

ASR Monitoring and Expansion Trends

The inspectors reviewed the ASR monitoring data for in-plane (i.e., pin-to-pin) and through-thickness (i.e., extensometer) measurements as well as a sample of building deformation threshold limit monitoring data. The inspectors observed that NextEra staff were appropriately collecting the data in accordance with the Structures Monitoring Program and projected the measurement data to establish trends. The inspectors also reviewed NextEra's completed ASR expansion rate evaluation for September 2022 (AR 02439834) and March 2023 (AR 2452081) that is required by an ASR license condition to ensure the six-month monitoring interval is adequate. The inspectors noted that several of the extensometer locations were projected to exceed the licensed through-thickness expansion limit before the expiration of renewed Seabrook operating license in 2050, but based on current rates, the projected time to exceedance is greater than 10 years.

Observation: Review of Recurrent Cooling Tower Service Water Through-Wall Piping Leaks	71152A

The inspectors reviewed the adequacy of Seabrook Station's corrective actions due to recurrent through-wall leaks that have occurred in the 'A' cooling tower service water discharge pipe. This review evaluated the problem identification and resolution aspects of multiple condition reports that were written to address the recurrent leaks and included actions from the most recent leak that occurred on December 27, 2022. This review included:

1) Action requests (ARs) 02311189 (April 2019), and 02341837 (January 2020) for previous leaks and trending of degradation;
2) ARs 02388338 (March 2021) and 02382406 (January 2021), which addressed potential gaps in coating evaluations following indications that the specific coating may be ineffective in areas of high turbulence; and
3) AR 0244651 (December 2022) to address a more recent through-wall piping leak.

The inspectors reviewed the corrective actions to address wall thinning identified in April 2019, which included subsequent coating repairs conducted in the fall 2021, under work order 40707046. The inspectors verified that coating repairs were conducted in accordance with station procedures, and utilized industry standards for adhesion testing that were reasonable and appropriate. The inspectors noted the most recent leak appeared to have occurred in a different area than the previous nine locations that were evaluated for thinning, as well as the locations that had undergone coating repairs.

The inspectors reviewed the adequacy of corrective actions as documented in AR 02444651, following the identification of a through-wall leak located on the discharge piping elbow of the 'A' cooling tower service water pump P-110A in December 2022. The inspectors reviewed the subsequent corrective actions, which included an operability assessment, equipment failure evaluation, maintenance rule functional failure determination, and subsequent repairs conducted via work order 40855718.

The inspectors determined that the actions to address the more recent leak were reasonable and appropriate, which included a code repair to the original design specification. Additionally, the piping segment, 1-SW-1818-001-153-24 is scheduled to be replaced during an upcoming 'A' train scheduled outage with an alloy resistant to the typical corrosion mechanisms, high turbulence, and impingement issues experienced by this segment of piping.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On March 10, 2023, the inspectors presented the Seabrook ASR inspection results to Brian Booth, Site Vice President, and other members of the licensee staff.
- On April 20, 2023, the inspectors presented the integrated inspection results to Kyle Barry, Nuclear Operations Site Director, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Procedures	OS1016.05	Service Water Cooling Tower Operation	Revision 40
71111.05	Miscellaneous	Drill Guide, B-EDG Day Tank (DG-F-3D-A)		
		FPI.67	Conduct of Fire Drills	Revision 7
71111.11Q	Procedures	OP-AA-100-1000	Conduct of Operations	Revision 38
71111.12	Corrective Action Documents	02381369		
		02392738		
		02424944		
71111.15	Corrective Action Documents	02445126		
		02447144		
	Procedures	OX1456.01	Charging Pump A & B Quarterly Flow and Valve Stroke Test	Revision 29
71111.24	Corrective Action Documents	02373776		
		02426760		
	Operability Evaluations	OX1461.04	SEPS Monthly Availability Surveillance	Revision 17
	Procedures	EX1808.014	Containment Enclosure Building Integrity 18 Month Surveillance	Revision 11
		OX1410.02	Quarterly Rod Operability Surveillance	Revision 30
		OX1413.03	B Train RHR Quarterly Flow and Valve Stroke Test	Revision 24
		OX1416.06	Service Water Discharge Valves Quarterly Test And 18 Month Position Verification	Revision 13
		OX1426.23	Emergency Diesel Generator 1B 24 Hour Load Test and Hot Restart Surveillance	Revision 30
		OX1426.27	DG 1B Semiannual Operability Surveillance	Revision 31
		OX1426.31	Emergency Diesel Generator 1B Interlock Test and Startup/Standby Surveillance	Revision 19
		OX1456.01	Charging Pump A & B Quarterly Flow and Valve Stroke Test	Revision 29
		OX1456.81	Operability Testing of IST Valves	Revision 44
	Work Orders	40787143		
		40812888		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		40855623		
		40855718		
		40855718-08		
71152A	Corrective Action Documents	02438330		
		02443925		
		02449316		
	Corrective Action Documents Resulting from Inspection	02450578		
		02450601		
		02450606		
		02450967		
	Engineering Changes	EC 295008	Subsequent Tier 3 Locations	Revision 1
	Procedures	EN-AA-203-1001	Operability Determinations / Functionality Assessments	Revision 39
		EN-AA-206-1001	Modification Turnover and Closeout	Revision 9
		FP 101196	Methodology for the Analysis of Seismic Category I Structures with Concrete Affected by Alkali Silica Reaction	Revision 3
		FP 101484	Methodology for the Evaluation of Other Seismic Category I Structures for Developing Operability Support Determinations	Revision 0
		PI-AA-104-1000	Condition Reporting	Revision 37
		SMPM	Structures Monitoring Program Manual	Revision 12